

SITE: Carrier Air
BREAK: 8.6
OTHER: VI

**CARRIER AIR CONDITIONING
SUPERFUND SITE**

PRELIMINARY CLOSE OUT REPORT



**U.S. Environmental Protection Agency
Region IV**



10663229

PRELIMINARY CLOSE OUT REPORT

(LONG-TERM REMEDIAL ACTION)

CARRIER AIR CONDITIONING SUPERFUND SITE SHELBY COUNTY, TENNESSEE

October 31, 1995

1.0 INTRODUCTION

This Preliminary Close Out Report documents that the Potentially Responsible Party (PRP) has completed all construction activities for the Carrier Air Conditioning Superfund Site in accordance with *Procedures for Completion and Deletion of National Priorities List Sites* (OSWER Directive 9320.2-3C). The PRP is the Carrier Corporation (Carrier) and their consultant is EnSafe. EPA, Carrier and EnSafe representatives conducted a Final Construction Inspection of the Long-Term Remedial Action (LTRA) on June 1, 1995. EPA determined that the PRP has constructed the remedy in accordance with the Remedial Design (RD) plans and specifications. Monitoring requirements, outlined in the Record of Decision (ROD) and RD documents, necessary to achieve site completion are underway.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Background

The Carrier Air Conditioning Site is located on the western side of Collierville in Shelby County, Tennessee. The Site is located at 97 S. Byhalia Road, near the intersection of Poplar Avenue and Byhalia Road, approximately 21 miles east of downtown Memphis.

In 1967, the town of Collierville installed a well field for potable water on the northwest corner of the Site. The operation consists of two wells, described as the West City Well and the East City Well, a treatment (aeration and chlorination) plant, and a storage tank. This area is identified as Water Plant 2 and pumps up to 1.4 million gallons per day of potable water to the town of Collierville. Although pumping rates vary depending upon demand, both wells are operational and currently in service.

The Site consists of approximately 135 acres owned principally by Carrier Corporation which operates a manufacturing plant on the property. Carrier, an air conditioning equipment manufacturer, developed the property in 1969-1970 and began manufacturing in 1971.

About 1972, Carrier installed a wastewater surface impoundment on the northwest corner of the property. The surface impoundment was approximately 50' by 48' and contained less than 1 foot of clarifier pit sludge at the time it was excavated in 1980. The excavated sludge was shipped offsite for disposal. According to plant personnel, the sludge consisted mainly

of an alkaline zinc phosphate washer sludge.

In 1979, the Carrier plant experienced a trichloroethylene (TCE) spill from a heated degreaser unit located on the south side of the plant. At the time of the spill, it was estimated that several thousand gallons of TCE were lost. The relative losses to air, ground and surface water are unknown.

On January 23, 1985, Carrier experienced a second release of TCE as a result of a pipe failure with an above-ground tank. An estimated 500 gallons were lost.

The Carrier Corporation has taken a number of steps to remove sources of TCE. Following the 1979 spill, a large area of asphalt pavement and underlying soil was excavated and disposed offsite before the area was repaved.

After the 1985 release, Carrier initiated a massive soil excavation and testing program to remove TCE and TCE-contaminated soils from the impact area.

On July 15, 1986, the Town of Collierville's west well in Water Plant 2 adjacent to the Site was sampled by the Tennessee Department of Environment and Conservation (TDEC) and found to contain TCE. Subsequent analyses conducted on a bimonthly basis have shown values of TCE in the untreated water from the west well ranging from 45 to 290 ppb. Values in the east well have ranged from 5 to 34 ppb for the untreated waters. Values in treated water, prior to chlorination, averaged 4 ppb, prior to installation of a treatment system to removed TCE and have since been consistently less than 2 ppb.

In 1987, the Site was placed on TDEC's List of Hazardous Substance Sites. In June 1988, it was proposed for inclusion on EPA's National Priorities List (NPL), and became final in 1990.

In 1989, Carrier installed a soil vapor extraction (SVE) system to remove TCE-contaminated groundwater and vapors from the area of the former surface impoundment. This system was installed as part of the Remedial Investigation (RI)/Feasibility Study (FS) treatability study.

In 1990, Carrier and the town of Collierville designed and installed an air stripping tower system at the Water Plant 2. This system removes TCE from raw water prior to entry into the chlorination system and subsequent distribution. The treatment system was designed to handle incoming TCE concentrations of up to 22⁰ ppb. Sampled effluent from the treatment system has been consistently below the detection limit of 2 ppb.

TYPD

2.2 RI/FS Summary

On September 28, 1989 Carrier and EPA entered into a Consent Order under which Carrier agreed to conduct the Remedial Investigation/Feasibility Study (RI/FS). The RI/FS fieldwork was conducted 1989 - 1992. Results of the RI/FS showed varying levels of TCE on the property. Soil and groundwater sample analyses confirmed that the two spill areas and the former lagoon area are the source of contamination to Site soils and groundwater. Seven major contaminants were identified. Of these, TCE and dichloroethylene (DCE) were the most frequently detected and generally found at the highest concentrations. Lead, zinc, 1,2-dichloroethane (DCA), tetrachloroethene (PCE) and vinyl chloride were also identified, due to their presence in one or more samples from groundwater monitoring wells and Site soils.

2.3 Record of Decision Summary

On September 3, 1992, EPA issued a Record of Decision (ROD) which selected a remedy to treat soil and groundwater contamination at the Carrier Site. The major components of the remedy include:

- Contaminated soils and shallow groundwater in the old lagoon and main plant source areas will be remediated using soil vapor extraction.
- Contaminated groundwater will be removed from the Memphis Sands aquifer using the existing extraction wells (at the City of Collierville Water Plant 2) and with supplemental wells. The contaminated groundwater will be treated with air stripping.
- Extracted groundwater after treatment will be (a) utilized in the municipal water supply; (b) discharged to a local publicly-owned treatment works (POTW); (c) discharged to surface water; or (d) reinjected to the Memphis Sand aquifer.
- Periodic monitoring will be conducted to assess the effectiveness of the remedy for a period up to 30 years.
- Institutional controls will be placed on well construction and water used in the general area of the Site.

The objectives of the remedial action are to:

- Prevent ingestion of groundwater contaminated at or above mandated MCLs/MCLGs;
- Restore the Memphis Sand aquifer to levels below MCLs/MCLGs;
- Prevent further contamination of the Memphis Sand aquifer; and
- Prevent migration of contaminants from the soils that cause the Memphis Sand aquifer groundwater to exceed MCLs and MCLGs.

Groundwater Cleanup levels:

TCE	5 ppb
DCE	70 ppb
DCA	5 ppb
PCE	5 ppb
Vinyl Chloride	2 ppb
Zinc	5,000 ppb
Lead	15 ppb

The cleanup standard for TCE-contaminated soil is 533 ppb or until in EPA's determination, it is demonstrated that contaminant concentrations have ceased to decline over time, and are remaining constant at some statistically significant level above remediation levels in the area of remediation, as verified by soil sampling.

From September 1992 until February 1993, EPA and the Carrier Corporation negotiated an RD/RA Consent Decree. Carrier notified EPA that they were willing to perform the work, but not under a Consent Decree. On February 11, 1993, EPA issued a Unilateral Administrative Order to Carrier for RD/RA. The PRPs agreed to comply on February 22, 1993.

3.0 REMEDIAL CONSTRUCTION ACTIVITIES

Remedial design activities began with the installation and operation of the soil-vapor extraction system at the North Remediation Site and the air stripper groundwater treatment system at the Town of Collierville Water Plant 2. Additional design field activities included (1) the installation of an SVE treatability study wells and probes and (2) a groundwater monitoring well cluster screened in the Memphis Sand and downgradient from Water Plant 2.

SVE

Soil field tasks that were performed as part of the Treatability Study included:

- North Remediation System (NRS) Confirmatory Boring Program
- Main Plant Area (MPA) SVE Test Wells and Probes Installation
- MPA SVE Parameter Evaluation Testing
- Pneumatic Characteristic Monitoring and Analysis
- Soil Gas Sampling Analysis

The design basis for the project initially focused on remediating three distinct areas which were identified as source areas of TCE contamination at the Main Plant Area-the 1985 storage tank pipe leak area east of the main building, the 1979 spill area immediately south of the former degreaser location, and a third area southwest of the 1979 spill area, which apparently occurred during a fire department response (when water was used to wash down

TCE from the 1979 spill area).

The number and location of the SVE wells depends on the dimensions of the contaminated area, which was determined while installing the pilot SVE wells. One deep and one shallow SVE extraction well were installed at each potential source area. Each shallow SVE extraction well was completed to 20 feet, and each deep SVE extraction well was completed to 40 feet. For each extraction well, three probes were installed at varying distances away from its respective extraction well.

Parameter evaluation tests (PETs) were conducted in these separate source areas to demonstrate the feasibility of utilizing vacuum extraction. The objectives of the PETs were to confirm the status of TCE-contaminated soils as described in the RI/FS, determine the air permeability of the shallow, silty clay zone and the deeper, sandy soils, evaluate treatment options based on air emission discharge rates, and determine site specific design criteria for full-scale vacuum extraction system. The PETs were initiated on December 1, 1993 and concluded on December 2, 1993. Based on the results of the PETs, additional SVE drilling activities were conducted to concentrate on the delineation of the shallow soil contamination.

Borings were completed as SVE wells if sample analyses from soil indicated TCE concentrations above the 533 ppb criterion; however, an area was only considered for remediation if the average of all boring sample analyses were above 533 ppb. Only borings in the area of the 1979 spill resulted in average TCE concentrations above 533 ppb. Work on the SVE wells was completed on May 23, 1994.

In the 1979 spill area, a total of six vacuum extraction wells were installed just below ground surface (bgs) to 20 feet bgs; and one vacuum extraction well screened from 30 to 40 feet bgs; and two horizontal extraction wells. The applied vacuum is designed to strip sorbed VOCs from the underlying soils, pull VOC contaminated air through two carbon units and discharge clean air to the atmosphere.

On October 1, 1994, and over the next 12 days, asphalt was cleared and trenching of underlying soils was conducted to provide the main trench run for the shallow and deep SVE well manifolds. SVE well vaults were also constructed and underground piping connected to the vaults and run through the trenches to the proposed equipment compound location. After final grading of the remediation area, a 10-inch thick concrete pad was installed over the area.

On January 4, 1995, treatment equipment was installed in the equipment compound per design drawings.

Groundwater

Groundwater field and design tasks included:

- Increase operating capacity at Collierville Water Plant 2 groundwater extraction system from its current rate (average 500 gpm) to a minimum rate of 750 gpm;
- Implement and design groundwater monitoring program including the installation of a downgradient well to verify containment by the existing city well system; and
- Assess potential actions triggered by monitoring results.

As a result of the field activities, groundwater sampling results and modeling assessment performed, it was concluded that no additional groundwater extraction is needed to supplement the Collierville wellfield or the attendant treatment system. Continuation of the current extraction rates at Water Plant 2 is sufficient. No modification to the treatment system is necessary to meet the remedial action objective of preventing ingestion of groundwater.

Untreated groundwater is pumped and treated by two well pumps, an air-stripping system (two air strippers), aeration tower, chlorine injection, and ground storage tank. The treated water is then pumped to the city's distribution system.

3.1 PRE-FINAL CONSTRUCTION INSPECTION

On February 23, 1995, EPA, Carrier, EnSafe, and TDEC representatives met at the Site for the purpose of conducting the Pre-Final Construction Inspection of the MPA SVE system. EnSafe prepared and submitted a Pre-Final Construction Inspection, that included a construction completeness punch-list for all outstanding items. EPA also prepared a checklist to be completed prior to the Final Inspection. This checklist, served as the basis for verifying the operational capability of the MPA SVE system during the Final Construction Inspection.

Carrier and EnSafe addressed all outstanding construction items identified as incomplete prior to the Final Construction Inspection.

3.2 FINAL CONSTRUCTION INSPECTION

The Final Construction Inspection was conducted by EPA, Carrier, and EnSafe representatives on June 1, 1995.

During the final inspection, the vacuum blower was operated at approximately 120 inches water column (WC) and wellhead flowrates were obtained from each well. Wellhead flowrates averaged 4 cubic feet per minute (cfm) with high flowrates to 8 cfm. The unsteady flowrate reading was probably due to each wellhead gate valve located approximately 1 foot from the flowrate port, resulting in a disturbed air flow. Vapor samples from each wellhead were also taken and injected into evacuate bottles for analyses. TCE concentrations ranged between 738 - 24,100 ppbV and DCE concentrations ranged between 145 - 1,390 ppbV.

After completion of the above, the monitoring probes were measured using a handheld digital manometer. Manifold vacuum was maintained at 120 inches WC. The highest reading was recorded at 6.9 inches and the lowest (deep monitoring probe) at 1.7 inches.

The last test of the day was to test the sphere of influence at the shallow wells. This was accomplished by shutting off all of the shallow wells and deep well at the wellhead. The vacuum at the blower was readjusted to 120 inches WC and vacuum response was measured at the remaining wells. Vacuum at monitoring probes ranged between 3.5 to 6.1 inches WC. This test confirmed that the sphere of influence in the shallow SVE wells is in excess of the design sphere of influence of 20 feet (radius).

The following discussion provides a description of design modifications and changes were implemented during operation of the SVE system. These changes are a result of discussions between attendees during the Final Construction Inspection. These changes and modifications were made to improve the operation of the treatment system and in response to site conditions, and do not alter the overall treatment process or remedial objectives set forth in the approved plans and specifications.

- Monitoring probe (MP) identification will be stenciled onto the concrete pads surrounding the covers.
- Flow direction arrows will be placed on the piping system in the compound.
- Drain water from MP-8B.
- A sampling port septum will be installed in the deep well manifold at the equipment compound.
- Pressure tap quick-connect fittings will be installed at each wellhead to enable use of the SVE wells as additional monitoring points.
- EnSafe will train Carrier plant personnel the basic operation of the system.
- Horizontal Gallery will be operated on periodic basis which will be dictated by amount of water present on initial run and the mass removal in the galleries compared to the shallow vertical wells.

4.0 DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

Activities at the Site were consistent with the ROD and UAO RD/RA statement of work issued to the Carrier Corporation for design and construction. The RD Report, including a Quality Assurance Project Plan, incorporated all EPA Region IV and State quality assurance and quality control (QA/QC) procedures and protocol. EPA analytical methods or EPA

approved methods were used for all samples during RD/RA activities. All procedures and protocol followed for soil and groundwater sample analysis during the RD/RA are documented in the Remedial Design Work Plan. The groundwater and soil-vapor analyses were conducted through a participating Contract Laboratory Program (CLP) in accordance with the statement of work. The soil analyses were performed by the Woodson-Tenant Laboratories utilizing a co-distillation method approved for this Site.

The QA/QC program used throughout the RA was rigorous and adequately complied with; therefore, EPA and the State determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RA, and consistent with the ROD and RD plans and specifications.

The Final Construction Report contains documentation of the sampling results to date. The Operation and Maintenance Plan (Main Plant Area SVE) - May 11, 1995 and the Groundwater Remedy Design - August 24, 1995 provide the QA/QC procedures and protocol for the remaining RA activities.

5.0 ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

Construction completion at the Site shall be documented by the signature of this Preliminary Close Out Report.

The Main Plant Area and North Remediation System SVE Systems will be routinely monitored and sampled on a quarterly basis. However, the frequency of monitoring will vary depending on the performance of the system, the actual mass of contaminants removed, and economic considerations.

The Performance Standards Verification Plan (PSVP) for the MPA and NRS Systems is under EPA review. The PSVP will be finalized by December 31, 1995. Once EPA and Carrier believe that attainment goals have been achieved, confirmatory soil borings will be installed in the MPA and NRS areas to verify attainment.

Water Plant 2 will continue to operated at a minimum pumping rate of 750 gpm. Routine groundwater monitoring and sampling will be conducted quarterly for one year, then annually thereafter at Water Plant 2 and selected monitoring wells. Restoration of the Memphis Sands aquifer will be considered attained when Water Plant 2 raw water samples and select monitoring well samples show trends, based on an exponential regression over the most recent 4 quarterly measurements, in containment concentrations, that predict with 95 % confidence that performance standards will be met within 90 days, then restoration is achieved.

The following activities will be completed according to the following schedule:

Task	Estimated Completion	Responsible Organization
1. Implement O&M Plan (Groundwater Remedy Design and O&M Plan - SVE)	6/95	PRP Contractor
2. Finalize SVE PSVP	12/95	EPA/State/PRP Contractor
3. Confirmatory Soil Boring (PSVP)	2/97	EPA/State/PRP Contractor
4. Complete Groundwater Pump & Treat	12/14	PRP Contractor
5. Approve Final Close-Out Report	2/15	EPA

6.0 FIVE-YEAR REVIEW

Upon completion of this remedy, no hazardous substances will remain on-Site above levels that prevent unlimited use and unrestricted exposure. However, because this remedy will require greater than five years to achieve these levels, pursuant to CERCLA section 121(c) and as provided in OSWER Directive 9355.7-02, *Structure and Components of Five-Year Reviews*, May 23, 1991, and OSWER Directive 9355.702A, *Supplemental Five-Year Guidance*, July 26, 1994, EPA must conduct a policy five-year review. The Five-Year Review will be completed prior to October 2000 (five years after the Preliminary Close Out Report signature).

7.0 DECLARATION

The U.S. Environmental Protection Agency IV hereby acknowledges that the remedial action construction is complete at the Carrier Air Conditioning Superfund Site. Upon successful completion of monitoring activities, EPA Region IV will issue a Final Close Out Report.

Approved By:



Richard D. Green, Associate Director
Office of Superfund and Emergency Response
USEPA, Region IV

31 OCT 95

Date



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
MEMPHIS ENVIRONMENTAL FIELD OFFICE

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October 26, 1995

Ms. Beth Brown
Remedial Project Manager
EPA Region IV
345 Courtland St., NE
Atlanta, GA 30365

Re: Draft Preliminary Close Out Report
Carrier Collierville Site, TN #79-552

Dear Ms. Brown:

This letter is to notify you that the Tennessee Division of Superfund (TDSF) has reviewed the Draft Preliminary Close Out Report received in this office on October 11, 1995, and the Operation and Maintenance Plan/Soil Vapor Extraction/Main Plant Area dated May 11, 1995 but received in this office on October 4, 1995.

TDSF concurs with EPA that the remedial action construction is complete with the understanding that levels of TCE in the soils around the SVE horizontal gallery, main plant area, will be consistent with the specified cleanup levels of 533 mg/kg for TCE. Should the horizontal wells fail to produce the desired results, additional remedial activity will be required.

If you have any comments or questions, please call me at 901-368-7956.

Sincerely,

A handwritten signature in cursive script that reads "Sharon Everett".

Sharon Everett, P.G.
Tennessee Division of Superfund

c: DSF, NCO
DSF, MFO